

Fort Bragg Terrace Area Groundwater Basin

- Groundwater Basin Number: 1-21
- County: Mendocino
- Surface Area: 24,100 acres (38 square miles)

Basin Boundaries and Hydrology

The Fort Bragg Terrace Area consists of a series of discontinuous, uplifted marine terrace deposits that lie along the northern California coastline within Mendocino County. This area of terrace deposits extends for approximately 50 miles along the coast from about Rockport on the north end to Point Arena on the south end. They extend inland from 0.2 to about five miles. The terrace deposits are thickest and most widespread in the Fort Bragg-Mendocino area. The Fort Bragg Terrace Area Groundwater Basin is defined by the areal extent of these terrace deposits. South of Point Arena, the terrace deposits of similar age are designated as the Fort Ross Terrace Area Groundwater Basin. The San Andreas Fault Zone trends northwest through the Point Arena area, which marks the approximate southern boundary of the Fort Bragg Terrace Area Groundwater Basin (Jennings 1977).

Four rivers and their associated groundwater basins transect the Fort Bragg Terrace Area including the Garcia, Navarro, Big, and Ten Mile Rivers. Precipitation along the Fort Bragg Terrace Area ranges from approximately 36 to 48 inches per year.

Hydrogeologic Information

Water Bearing Formations

Terrace Deposits form the primary water bearing formation in this area. The terrace deposits are underlain by bedrock of the Franciscan Complex. The Franciscan Complex is considered essentially non-waterbearing although adequate well yields can be obtained from this unit in variable locations. Information on the terrace deposits and groundwater conditions was taken primarily from DWR (1982).

Terrace Deposits. Marine terrace deposits of Pleistocene age overlie wave-cut bedrock surfaces along the northern California coastline. They occur as a series of benches or steps, uplifted above sea level over the last half-million years. Up to five terrace levels have been identified. The marine terrace deposits are predominantly massive, semiconsolidated clay, silt, sand, and gravel, and range from 1 to 140 feet in thickness. The deposits range from being clean sand, well-sorted, fine to coarse sand, to poorly sorted, fine to coarse sand with a silty matrix. Fine to medium gravel occurs as lag gravel layers and in lenses of conglomerate. Terrace composition varies and reflects the lithologies of the parent bedrock.

Terrace deposit wells yield water from 1 to 75 gpm, with most wells yielding between 8 and 29 gpm; average yield is about 14 gpm. Since the terrace deposits cap the bedrock, the aquifer is generally unconfined. Average specific yield for this unit ranges from 8 to approximately 12 percent.

Groundwater Level Trends

No recent hydrographs are available in order to evaluate long-term water level trends. However, for the Mendocino County coastal area, it was concluded that the marine terrace deposits reach maximum storage by mid-January of each year under normal rainfall conditions (DWR 1982).

Groundwater Storage

Groundwater Storage Capacity. Storage capacity for the total area of marine terrace deposits extending from Rockport to Gualala was estimated at 131,180 af (DWR 1982). This estimate is for a study area that is considerably larger than the currently defined Fort Bragg Terrace Area Groundwater Basin. Therefore, it does not accurately reflect the total storage for this defined groundwater basin. An estimate of 112,780 af was obtained for an area that roughly matches the limits of the Fort Bragg Terrace Area Groundwater Basin based on storage data from the Westport, Fort Bragg, Albion, and Elk subunits (DWR 1982).

Groundwater in Storage. No recent groundwater in storage estimates are published. However, it was concluded that under normal rainfall conditions, the terrace deposits reach maximum storage by mid-January of each year (DWR 1982).

Groundwater Budget (Type C)

There are insufficient data available in order to prepare a groundwater budget for this basin.

Groundwater Quality

Characterization. Groundwater quality is generally good within the Fort Bragg Terrace Area Groundwater Basin. Analysis of water samples in May 1962 from 15 wells in the Fort Bragg area indicated that sodium bicarbonate-chloride type water of good mineral quality was available from the terrace deposits (DWR 1968). The 1968 study reported that TDS ranged from 72 to 481 ppm, hardness ranged from 22 to 255 ppm, and iron ranged from 0.13 to 2.8 ppm. Based on analyses of 16 water supply wells in the basin, TDS ranges from 26 to 650 mg/L and averages about 185 mg/L.

Impairments. Ferrous iron and sulfate occur sporadically within the study area (DWR 1982). Seawater intrusion is not a common problem in the study area, though it has occurred in localized areas near Point Arena where wells drilled below sea level and near the ocean have reduced or reversed the seaward flow of fresh groundwater. The terrace deposits between Ten Mile River and Laguna Point and Alder Creek and Point Arena are susceptible to seawater intrusion.

Water Quality in Public Supply Wells

Constituent Group ¹	Number of wells sampled ²	Number of wells with a concentration above an MCL ³
Inorganics – Primary	46	0
Radiological	15	0

Nitrates	46	0
Pesticides	25	0
VOCs and SVOCs	24	0
Inorganics – Secondary	46	10

¹ A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).

² Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.

³ Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Production characteristics

Well yields (gal/min)

Terrace deposit wells yield water at rates ranging from approximately 1 to 75 gpm; average yield ranges from about 10 to 16 gpm; specific capacities reportedly range from about 0.5 to 1.0 gpm/ft. (DWR 1982)

Total depths (ft)

Domestic	Range: 10 – 390	Average: 103 (Based on 822 well completion reports)
Municipal/Irrigation	Range: 35 – 420	Average: 141 (Based on 13 well completion reports)

Active Monitoring Data

Agency	Parameter	Number of wells / measurement frequency
DWR	Groundwater levels	None.
DWR	Miscellaneous water quality	4 wells
Department of Health Services and cooperators	Title 22 water quality	51 wells / annually

Basin Management

Groundwater management:	No groundwater management plans identified; the Mendocino City CSD has implemented a water well ordinance.
Water agencies	
Public	Mendocino County W.A., Elk County W.D., Irish Beach W.D., City of Fort Bragg W.S.A., City of Mendocino CSD
Private	

References Cited

- California Department of Water Resources (DWR). 1965. Water Resources and Future Water Requirements – North Coastal Hydrographic Area, Volume 1: Southern Portion (Preliminary Edition) – Bulletin No. 142-1.
- _____. 1968. DWR Memorandum Report. Future Water Projects: Fort Bragg and Anderson Valley Areas.
- _____. 1982. Mendocino County Coastal Ground Water Study. Northern District.
- Jennings, C.W., 1977. Geologic Map of California. Geologic Map Data Series Map No. 2. Scale 1:750,000. California Department of Conservation, Division of Mines and Geology.

Additional References

- California Department of Water Resources. 1958. Recommended Water Well Construction and Sealing Standards, Mendocino County. Bulletin No. 62.
- California Department of Water Resources. 1975. California's Ground Water. Bulletin 118-75.
- United States Bureau of Reclamation. 1979. Mendocino County Study – Possibilities for Development of Water Supplies for the Round, Little Lake, and Anderson Valleys, and the Fort Bragg-Mendocino Area. Appraisal Report.

Errata

Changes made to the basin description will be noted here.